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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,339	12/15/2003	Rajesh K. Saini	2001-IP-005484U1P1	3700

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ROBERT A. KENT
P.O. BOX 1431
DUNCAN, OK 73536

EXAMINER	
LIGHTFOOT, ELENA TSOY	

ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
03/10/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ROBERT.KENT1@HALLIBURTON.COM
Tammy.Knight@Halliburton.com

Office Action Summary	Application No.	Applicant(s)	
	10/736,339	SAINI ET AL.	
	Examiner	Art Unit	
	ELENA Tsoy LIGHTFOOT	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42-61* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/11/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Reopening of Prosecution After Appeal Brief

In view of the appeal brief filed on December 21, 2009, PROSECUTION IS HEREBY REOPENED. New grounds of rejection set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Timothy H Meeks/

Supervisory Patent Examiner, Art Unit 1792

Status of the Claims

Claims 42-61 are pending in the application. Claims examined on the merits are 42-61.

Specification

The disclosure is objected to because of the following informalities: page 6, P19), line 6 from the bottom, "a poly(e-caprolactone)" should be changed to "a poly(ε-caprolactone)".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 42-48 and 55-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al (US 6,209,643) in view of Lee et al (US 6,817,414) and Still et al (US 7166560).

Nguyen et al discloses a method for treating a subterranean formation and uniformly delivering a controlled release of a treatment chemical to the formation (See column 4, lines 29-35), the method comprising the steps of providing a fluid suspension including a *mixture* of a particulate, a tackifying compound and a **treatment chemical**, pumping the suspension into a subterranean formation and depositing the mixture within the formation (See Abstract). The fluid suspension is made by mixing particulate

material such as conventional **proppants or gravel** packing materials (See column 4, lines 4-7), with a liquid or solution of a tackifying compound in a solvent (See column 5, lines 10-13) such as **alcohol** (See column 5, lines 55-56). The tackifying compound **coats** at least a portion of the particulate *upon admixture therewith,* a **treatment chemical** which may be in particulate form or coated upon and, optionally, a hardenable resin, ***coats* or is *coated* upon at least a portion of the particulate** (See column 3, lines 43-46). The presence of the tackifying compound on the particulate causes the treatment chemical containing or coated particles to adhere to and remain dispersed within the coated particulate both **during mixing**, introduction into the formation and upon placement therein (See column 4, lines 56-60).

As to claimed on-the-fly coating, Nguyen et al teaches that the mixture of particulate material such as conventional **proppants or gravel** packing materials and a liquid or solution of a tackifying compound and a hardenable resin is formed by a "simultaneous mixture" of components, i.e. by blending together a liquid or solution of tackifying compound with the **proppants or gravel** packing materials in *the initial steps* of the subterranean formation treatment process or the preparation for the performance of the treatment process (See column 4, lines 11-15) wherein the **treatment chemical** is **coated upon** at least **a portion of the particulate** (See column 3, lines 43-46). Nguyen et al further teaches that the liquid or solution of tackifying compound and the hardenable resin generally are incorporated with the particulate as a *simultaneous mixture* by introduction into the fracturing or gravel packing fluid along with the particulate (See column 8, lines 8-11). The **treatment chemical** may be introduced in a

similar manner and may be at least partially coated by the tackifying compound or may **adhere to the particulate** which has been **at least partially coated** with the tackifying compound (See column 8, lines 12-15). Thus, coating the coating solution containing the **treatment chemical** onto the gravel in Nguyen et al reads on claimed on-the-fly coating, as required by claims 42 and 49.

As to acid-releasing degradable material, Nguyen et al teaches that the treatment chemical may comprise gel breakers, such as **oxidizers**, **enzymes** or **hydrolyzable esters** that are capable of **producing a pH change** in the fluid, or substantially any other chemical which is soluble in the fluids in the formation at the temperature conditions within the formation within which it is placed (See column 4, lines 40-43). Gravel packing treatments generally are performed at lower rates and pressures whereby the fluid can be introduced into a formation to create a controlled particle size pack surrounding a screen positioned in the wellbore where fracturing of the formation may or may not occur (See column 8, lines 20-25). The particulate pack surrounding the wellbore then functions to prevent fines or formation particulate migration into the wellbore with the production of hydrocarbons from the subterranean formation (See column 8, lines 25-28). The treatment chemical then is dissolved by the fluids present in the formation to provide the desired treatment. (See column 8, lines 28-33).

Nguyen et al fails to teach that the treatment chemical comprises an acid-releasing degradable material selected from the group consisting of poly(orthoester); a lactide, a poly(lactide); a glycolide; a poly(glycolide); a poly(ε-caprolactone); a poly(hydroxybutyrate); a substantially water insoluble anhydrides; a poly(anhydride); a

poly(amino acid); a mixture of one of the above-listed compounds; or a copolymer of two or more of the above-listed compounds; and any combination thereof (Claim 42).

Lee et al teaches that in order to be able to fill the annular space with sand completely and successfully, the hydrocarbon-bearing formation should have been previously covered with a thin layer of firm and impermeable filter cake formed by the reservoir drilling fluid (See column 1, lines 29-34). After the gravel pack sand has been successfully placed, the filter cake existing between the gravel pack sand and the formation needs to be removed before the flow of hydrocarbon is initiated (See column 1, lines 37-43). To destroy the filter cake that is now behind the gravel pack sand, *various chemicals, breakers* and mechanical devices have been developed and used (See column 1, lines 44-46). For example, hydrochloric acid is often delivered by a separate operation to soak the gavel pack sand and filter cake with the aid of wash cups (See column 1, lines 46-48) to destroy a large amount of the acid-soluble and acid-breakable components in the filter cake (See column 1, lines 51-55). The mechanical wash cups attached to the end of a work string must be picked up at the surface and lowered to the bottom through the inside of the screen, and the hydrochloric acid is then pumped through the gravel pack sand *repeatedly* (See column 1, lines 49-53). Other breakers, such as ***oxidizers and enzymes***, may also be delivered to destroy oxidizer- and enzyme-breakable organic components in the filter cake, such as starch polymers (See column 1, lines 56-58). However, these breakers are considered less efficient in several ways: first, they are not effective in destroying acid-soluble and acid-breakable inorganic components in the filter cake, such as calcium carbonate; second, many

oxidizing breakers have compatibility issues with certain brines; and third, in addition to brine compatibility issues, most enzyme breakers will lose reactivity in highly concentrated divalent brines, and at temperatures above 200^0 (See column 1, line 58 to column 2, line 6). Thus, there exists an on-going need and desire for breakers which provide a slow release mechanism to initiate the disintegration of filter cakes so that gravel pack operations can be continued (See column 2, lines 44-49). It was found that replacing conventional gravel pack sand typically used for gravel packing by polymerized *alpha-hydroxycarboxylic acid coated proppants* such as polyglycolic-acid-coated sand, provides under downhole conditions, the acidic by-product generated from the hydration of polyglycolic-acid-coated sand that can break down acid-soluble and/or acid-breakable components embedded in the filter cake thereby enhancing the filter cake removal (See column 2, lines 51-64).

Still et al teaches that two methods of removing filter cake are known in the art: (1) a method of pumping an acidic fluid from the surface and down the wellbore above fracture pressure for to provide flow path in a filter cake (See column 1, lines 17-29); and (2) a second method providing delay formation of the acid by the hydrolysis of **esters** such as methyl formate and methyl acetate as in situ acid generators in the oilfield as described by Templeton, et al., in "Higher pH Acid Stimulation Systems", SPE paper 7892, 1979. However, the first method generally has two major problems encountered during this normal procedure: first, acid corrosion of iron-containing components of the wellbore such as casing, liner, coiled tubing, etc. (See column 1, lines 30-32); and second, the acid will naturally react with the first reactive material with

which it comes into contact which may be a filter-cake, may be the formation surface forming the wall of an uncased (or openhole) wellbore, may be the near-wellbore formation, or may be a portion of the formation that has the highest permeability to the fluid, or is in fluid contact with a portion of the formation that has the highest permeability to the fluid (See column 1, lines 42-62); and in the second method, ***ester*** acid precursors are liquids, and these reactions take place very rapidly as soon as the acid precursors contact water (See column 2, lines 23-25). There is a need for a new method of delayed, controlled release of acids from solids in situ in acid fracturing (See column 2, lines 26-27). The use of a solid acid-precursor such as lactide, glycolide, polylactic acid (**polylactide** –see column 3, lines 29-31), *polyglycolic acid* (**polyglycolide** –see column 3, lines 33-35), a copolymer of polylactic acid and polyglycolic acid, a copolymer of glycolic acid with other hydroxy-, carboxylic acid-, or hydroxycarboxylic acid-containing moieties, a copolymer of lactic acid with other hydroxy-, carboxylic acid or hydroxycarboxylic acid-containing moieties, or mixtures of the preceding provides a desired controlled release of acid by hydrolysis and dissolution (See column 2, lines 31-40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polylactide, polyglycolide as a treatment chemical in Nguyen et al instead of oxidizers, enzymes or hydrolyzable esters that are capable of producing a pH change with the expectation of providing the desired controlled release of acid by hydrolysis, as taught by Lee et al and Still et al.

As to claimed solvent of claims 46 and 52, obviously, one of ordinary skill in the art would use a conventional alcohol such as methanol and isopropanol as a solvent in Nguyen et al because Nguyen et al does not limit their teaching to particular alcohols.

As to claims 47 and 53, plasticizers were not addressed because they are *optional*.

As to claims 48 and 54, poly(orthoester) is not addressed because it is *optional*.

As to claim 55, Still et al teaches that one example of a suitable solid acid-precursor is the solid cyclic *dimer* of lactic acid (i.e. oligomeric lactic acid) which has a melting point of 95 to 125^{0}C, or solid cyclic dimer of glycolic acid (known as "glycolide"), which has a melting point of about 86^{0}C (See column 3, lines 25-33). The dissolution of solid acid-precursors in acid fracturing may be accelerated by the addition of certain soluble liquid additives that hydrolyze to release organic acids such as esters (including *cyclic esters*), *diesters*, anhydrides, *lactones* and amides (See column 5, lines 15-29). It is the Examiner's position that the above additives that are liquid at well bore temperature would make polymers in a fracturing fluid more flowable, and thus, would read on claimed **plasticizer**.

3. Claims 42-48 and 55-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, as applied above, and further in view of Murphey et al (US 4,829,100).

If it could be argued that Nguyen et al does not read on claimed on-the-fly coating, Murphey et al teaches that particulate material utilized in the performance of packing procedures or as a proppant material in fracturing treatments (See column 9,

lines 62-68) can be coated rapidly and continuously by admixing in a stream (on-the-fly) (See column 2, lines 37-42) instead of batch mixing which requires a period of time, e.g., at least about 15 minutes to several hours to obtain satisfactory coating of the particulate material before the slurry may be introduced into a placement zone (See column 2, lines 17-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coated gravel in the cited prior art on-the-fly with the expectation of providing the desired rapid and continuous coating, as taught by Murphey et al.

4. Claims 42-48 and 55-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, as applied above, and further in view of McDougall et al (US 5,192,615).

The cited prior art fails to teach that the fluid suspension further comprises a plasticizer (Claims 42, 47, 49, 53, 55, 60) that does not comprise starch (Claim 55).

McDougall et al teaches that generally a fracturing fluid comprises a viscous or gelled polymeric solution, a propping agent, a chemical breaker and other additives commonly used in fracturing fluids (See column 2, line 65 to column 3, line 1), **friction-reducing** agents such as small amounts of high molecular weight linear polymers such as polyacrylamide (See column 8, lines 7-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have added starch to the fluid suspension of Nguyen et al with the expectation of providing the desired control of fluid loss since McDougall et al

teaches that **starch** is an additive *commonly* used in fracturing fluids as a fluid loss or wall building agent.

5. Claims 42-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al '643 in view of Lee et al '414 and Still et al '560, as applied above, and further in view of Mikos et al (WO 9425079A1).

The Examiner Note: for convenience, instead of WO 9425079A1, the Examiner will refer to US 6689608 of the same patent family.

The cited prior art fails to teach that the treatment chemical comprises an acid-releasing degradable material selected from the group consisting of poly(orthoester); a poly(ε-caprolactone); a poly(hydroxybutyrate); a substantially water insoluble anhydride; a poly(anhydride); a poly(amino acid); a mixture of one of the above-listed compounds; or a copolymer of two or more of the above-listed compounds and any combination thereof (Claim 49); or polyorthoester (Claim 61).

Mikos et al teaches that a synthetic polymer which degrades in a controlled manner by hydrolysis include polyglycolic acid, polylactic acid, *polyorthoester, polyanhydride*, or copolymers thereof (See Abstract). It is well known in the art that all these polymers hydrolyze with release of an acid.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used polyorthoester or polyanhydride as a treatment chemical in the cited prior art instead of polyglycolic acid or polylactic acid with the expectation of providing the desired hydrolysis in a controlled manner (i.e. providing the desired controlled release of an acid), as taught by Mikos et al.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 20040175691 to Brown et al is cited here to show that a class of biodegradable polymers include *polylactic acid, polyglycolic acid*, copolymers of polylactic and polyglycolic acid, *polyepsilon caprolactone*, *polyhydroxy butyric acid*, **polyorthoesters**, polyacetals, polydihydropyrans, polycyanoacylates, and crosslinked or amphipathic block copolymers of hydrogels can be used for controlled release of drugs (See P104).

Response to Arguments

7. Applicant's arguments with respect to claims 42-61 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELENA Tsoy LIGHTFOOT whose telephone number is (571)272-1429. The examiner can normally be reached on Monday-Friday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy Lightfoot, Ph.D.
Primary Examiner
Art Unit 1792

March 8, 2010

/Elena Tsoy Lightfoot/